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2. **Proposed by E. S. LOOMIS, A. M., Ph. D., Professor of Mathematics, Baldwin University, Berea, Ohio.**

Show that the indeterminate form $\frac{x-\frac{2}{3}\sin x-\frac{1}{3}\tan x}{x^5}=\frac{-1}{20}$, when $x=0$.

[Ex. 51, p. 112, *Williamson's Differential Calculus.*]

3. **Proposed by H. C. WHITAKER, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.**

The product of two sides of a triangle is 6000(k^2), the length of the bisector of the included angle is 60 (l). What is the maximum area of the triangle, what is the greatest length of the third side. and what the total length swept over by the triangle, the bisector remaining fixed? [Selected from *Philadelphia Call*, 26 May. 1890.]

4. **Proposed by J. M. COLAW, Principal of High School, Monterey, Virginia.**

Three towns A, B, and C are in the same straight line. The distance from A to B is 20 miles and the distance from B to C is 80 miles. A pedestrian started from B for C and traveled at the variable rate of 10 miles an hour reciprocally as the cube root of his distance from A. In what time did he travel from B to C?

5. **Proposed by CHARLES E. MYERS, Canton, Ohio.**

The volume generated by the curve whose equation is $y^2=px$. revolving about its axis, is cut by a right cylinder whose equation is $y^2=px-x^2$, the axis of the latter passing through the focus of the former. Find the volume common to both by the formula $V=\int\int\int dxdydz$.

6. **Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Ohio.**

A string is wound spirally twenty times around a cylinder 20 feet high and 2 feet in diameter. Through what distance will a dove fly in unwinding the string keeping it tense at all times (1) flying in the same plane and (2) not flying in the same plane?

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MECHANICS.

Conducted by B. F FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

PROBLEMS.

1. **Proposed by A. M. SCRIPTURE, A. M., Principal of Schools, New Hartford, New York.**

Suppose A and B to start at the same time from the same point in a level plane. A walks south, going 30 inches at a step, stepping twice in a second and beating a drum at the begining of each step. B steps west 30 inches every time he hears the drum beat. How far apart will they be at the end of 15 minutes, if the temperature of the air is +41° Fahrenheit?

2. **Proposed by WILLIAM SYMMONDS, A. M., Professor of Mathematics and Astronomy, Pacific College, Santa Rosa, California.**

The axis of a parabola coincides with a vertical line. What is the position of that focal chord through which a body would roll down in the least time?

3. **Proposed by CHARLES E. MYERS, Canton, Ohio.**

A spherical air-bubble, having risen from a depth of 1,500 feet in water, was one inch in diameter when it reached the surface; what was its diameter at the point of starting?

4. **Proposed by DeVOLSON WOOD, M.A., C.E., Professor of Mechanical Engineering, Stevens Institute of Technology, Hoboken, New Jersey.**

A particle starts at rest and revolves in a circle with a uniform acceleration, acquiring a velocity v in t seconds. Find the locus of the foot of the perpendicular from the centre of the circle upon the resultant acceleration.

5. **Proposed by J. R. BALDWIN, A. M., Professor of Mathematics and Commercial Law, Davenport Business College, Davenport, Iowa.**

A 200 pound ball lies on a three legged table, having the legs equally distant apart and perpendicular to the plane of the top of the table. (1) What is the weight on each leg of the table not including the top when the ball is 2 feet, 3 feet, and 4 feet distant from the three legs? (2) If the ball is 2 feet, 3 feet, and 5 feet from the legs, what must be the weight of the top to keep from tipping and the weight on each leg excluding the top and also including the top?

DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

PROBLEMS.

1. **Proposed by EARL D. WEST, West Middleburg, Logan County, Ohio.**

It is required to divide a given square number into two such parts that each part will be a square number.

2. **Proposed by J. M. COLAW, Principal of High School, Monterey, Virginia.**

Find two numbers, such that the difference of their squares may be a cube, and the difference of their cubes a square.

3. **Proposed by O. S. KIBLER, Superintendent of Schools, West Middleburg, Logan County, Ohio.**

It is required to find three whole numbers in an arithmetical progression, such that the sum of every two of them shall be a square.

4. **Proposed by H. W. HOLYCROSS, Superintendent of Schools, Pottersburg, Union County, Ohio.**

What value of x will render $4x^4+12x^3-3x^2-2x+1$ a square?

AVERAGE AND PROBABILITY.

Conducted by B. F. FINKEL, Kidder, Missouri. All contributions to this department should be sent to him.

PROBLEMS.